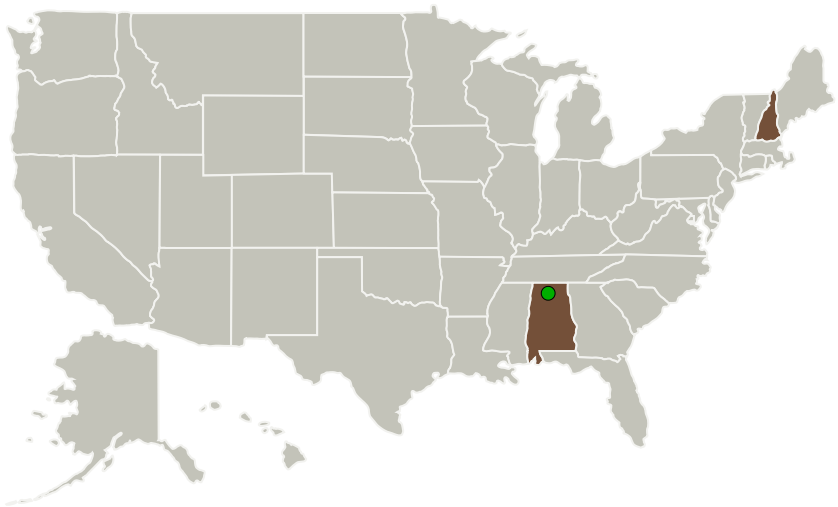
Compact Vacuum Pump for Titan Lander Missions, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

NASA, the Department of Defense, the Department of Homeland Security, and commercial industry have a pressing need for miniaturized, rugged, low mass, power efficient, high vacuum systems that can achieve vacuum pressures as low as 10E-8 torr while exhausting to greater than 1 atm. Advances in sensor technology at NASA and other government laboratories, in academia, and in industry, have led to the development of very small mass spectrometer detectors. However, the vacuum systems to support these sensors remain large, heavy, and power hungry. To meet this need, Creare proposes to build a compact vacuum pump based on the innovative combination of a turbomolecular pump to achieve hard vacuum pressures; a molecular drag pump to compress the gas through the transition regime of the gas; and a regenerative pump that compresses the gas further to exhaust to pressure greater than 1 atm. The pump represents an order-of-magnitude reduction in mass, volume, and power over current, commercially available, state-of-the-art vacuum systems that provide pumping over the same pressure range. Our unique vacuum pump design is based on technologies previously demonstrated at Creare that are combined in an innovative way to achieve the goal of providing vacuum pressures as low as 10E-8 torr while exhausting to greater than 1 atm in a small, low mass, power efficient package.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	New Hampshire

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140010)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Creare LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Paul H Sorensen

Co-Investigator:

Paul Sorensen

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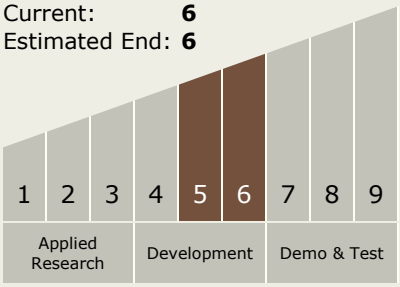
Technology Maturity (TRL)

Start: **5**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System